Operational Concept
Template, Version 1.0

May 7, 1999

Title: National Airspace System (NAS) Operational Concept (OPSCON), several types

Description: A National Airspace System Operational Concept presents, within a given timeframe, a top level series of thoughts about what a system is and does within a well-described environment. The NAS OPSCON, in whatever form, should be based on an approved mission need statement that articulates the driving conditions, assumptions and possible benefits that create the justification for preparing a concept of operation.

For the purposes of this template, the phrases "operational concept" (OPSCON) and "concept of operations" (CONOPS) are considered equivalent. A NAS 'Concept of Use' for the entire system or a particular component or sub-system should include only those items listed under conceptual viewpoint below. The word "shall" has been avoided in this template in favor of the words "may" and "should", which imply choices made by appropriate individuals or organizations.

The motivation for this template is to be useful for preparing a wide range of OPSCONs and allowing the framework to be used as is by just putting "N/A"--for not applicable, against any unnecessary paragraph.

A National Airspace System operational concept is used for long range planning activities and serves as one element of the system documentation. A NAS OPSCON may describe the entire NAS or a particular component or sub-system within the NAS. An OPSCON may cover the current time or some future time. This template considers the following types of OPSCON:

Type 1 – Current NAS, entire system
Type 2 – Current NAS, an identified sub-system
Type 3 – Future NAS, entire system
Type 4 – Future NAS, an identified sub-system

Each type of OPSCON should consider the ideas expressed from at least three different points of view or "viewpoints": the conceptual, the functional, and the architectural. These viewpoints could be thought of as the "what", the "high level how" and the "detailed how".

A Type 1 NAS Operational Concept should include the following viewpoints and related information:

Conceptual Viewpoint (Chapter 2.0 in Preparation Instructions)

Discussion of the **themes and assumptions** driving the operational concept
Definition of the **operational environment** in which the system or component will exist and operate
Discussion of the system **mission and services**
Identification of system **functions and flight phases**

Descriptions of the **users, operators/service providers**, **operating positions** and their perspective of the system
Discussion of **alternative modes of operation**
The use of **operational scenarios (using operational sequence diagrams)**
A trip through the operational system (a "story")
Discussion of the real or potential **costs and benefits**

Functional Viewpoint (Chapter 3.0)
A detailed discussion of the specific functions
The use of **system/functional block diagrams**, **data flow diagrams** and more detailed **operational sequence diagrams**
A discussion of **human/machine (including human/computer)** and other **interfaces**

Architectural Viewpoint (Chapter 4.0)
Discussion of **infrastructure** and **support** considerations
A description of the operational **facilities,** required **technologies,** or relevant **architecture** items that provide the services
Connectivity amongst the Viewpoints (Appendix)
Linkages amongst the conceptual, functional and architectural
Linkages to an external 'test plan' from the conceptual to the specific items under test
Additional Information (Appendix or elsewhere)
Glossary (or terms)
Acronyms
Benefits/Costs data (if available)

A Type 2 NAS Operational Concept should use the same outline as above for the Type 1 except that the scope of discussion and description should be limited to the identified sub-system and its interfaces with the larger system.

A Type 3 NAS Operational Concept should use the same outline as above for the Type 1 except that the conceptual, functional and architectural transitions from the current to the future time should be made clear. In a Type 3 Operational Concept there is a need to establish an appropriate description of the current system, but the bulk of the discussion should focus on the future.

A Type 4 NAS Operational Concept should us the same outline as above for the Type 1 except that the scope of the discussion and description should be limited to the future sub-system and its interfaces with the larger system. The larger system should be described in sufficient detail to permit a reader to fully understand the required interfaces to the future system, and their expected performance.

Audience: The customer, the users and operators, the maintainers, the designers, implementers and integrators, and all contributors to the completed document are the audience to which the document is directed including the national and international aviation community at large.

References:

1. The FAA's Air Traffic Service Vision of the Future ATC System serves as an excellent reference for an OPSCON.

2. NAS-SR-100 and 130 provide excellent references for a set of NAS operational scenarios, missions, operational roles/responsibilities and many other aspects of NAS operations. The level of detail in these documents is also applicable.

3. It is expected that a separate NAS Architecture volume will be referenced and that only a summary of the NAS Architecture would be provided in this document. An OPSCON should make maximum reference to the FAA's Architecture Version 4.0 (January 1999) information.

4. The Future Air Flight Management System - Air Traffic Management Next Generation (FANG) Operational Concept (DOT/FAA/AND-97/7)

Preparation Instructions: An Operational Concept document should include, but not be limited to, the sections organized according to the following outline:

Executive Summary

Acknowledgements
Abstract

1.0 Introduction
1.1 Background
1.2 Objective and Intended Use
1.3 Scope
1.4 Document Organization
1.5 Glossary/Acronyms

2.0 Conceptual Viewpoint
2.1 Themes and Assumptions
2.2 Operational Environment and Characteristics
2.3 Operational Mission and Services
2.4 Functions
2.5 Facilities
2.6 User/Operator Profiles and Positions
2.7 Operational Modes
2.8 Operational Process/Operational Sequence Diagrams
2.9 A Trip Through the Operational System (a "story")
2.10 Possible Costs and Benefits
2.11 Operational Feasibility

3.0 Functional Viewpoint (either by Domain and/or Phase of Flight)
3.x Domain and/or Flight Phase "X"

Content and Format Instructions: The NAS Operational Concept document should be prepared in accordance with the following content and format instructions.

Executive Summary
The executive summary contains a high level discussion of the salient features or highlights of the operational concept. This section should be written for the broad management level audience and provide sufficient information such that the manager will understand the significant proposed or modified operational changes to the NAS Operational as the system evolves over time. Essential transition points should be identified as a function of time and the associated changes in operation described.

Acknowledgements
This section should contain the list and associations of those individuals or organizations without whom the operations concepts would not have been prepared.

Abstract
This section is a half-page overview of the purpose and content of the operations concept written for a general, but interested, audience.

1.0 Introduction
The introduction section summarizes the organizations that developed the operational concept and the background discussing the rationale as to why the operational concept was developed. This section should clearly state the purpose for the development of the document and the process used to develop the document. This section should discuss the perspective from which the operational concept is presented and the elements covered. The method of presenting the information is described and the document's organization relative to the information content is presented.

Finally, the contribution of this OPSCON to the community should be discussed to address the question of why the document was written in the first place.

1.1 Background
The focus of the background section is to present the detailed rationale for and the environment surrounding the development of this operational concept. It responds to and answers the question "Why is the concept needed at this time?"

The background should also discuss similar or other known concepts that were, or could be, considered in relation to the operational concept being presented.

1.2 Objective and Intended Use
This section presents the purpose of the document and what it hopes to achieve. The elements of the FAA and the aviation community that will benefit from the document and how it will be employed by these various elements are documented in this section. Identification of special terms and definitions are also provided in this section.

1.3 Scope

This section identifies the elements of the system and the aspects of the system operations that will be treated by this document. It identifies the specific user and operator perspectives that will be used to describe the operational concept. It responds to the questions of which elements of the user and operator community (e.g., general aviation, military, rotorcraft operators, AOC) will be included and which rules (e.g., IFR, VFR) and procedures will be covered by the concept descriptions. In addition, the modes of operation treated by the concept description are identified and defined.

1.4 Document Organization

This section defines the organization of the document by section and identifies the methodology used to present the operational concept. Specifically, the services, functions, domains, and flight phases are identified and defined. Methods of presentation including scenarios and sequence diagrams are also defined in this section.

1.5 Glossary and Acronyms

This section presents the glossary of terms and the acronyms used throughout the entire document.

2.0 Conceptual Viewpoint

This section provides a top-level description of the Operational Concept, its mission, services and functions, and discusses **what** the Concept is and, briefly, **how** it operates. Alternatively, this section discusses the portion of the NAS that a specific component will conceptually cover.

Section 2.0 (top paragraph) should start with a brief discussion (no more than two pages) of the Operational Concept. The section 2.x paragraphs below should further expand on this top-level discussion.

2.1 Themes and Assumptions

This section presents the driving themes and operating assumptions that surround the operational concept. These themes and assumptions should stem from an analysis of the mission needs statement and other sources that do or could potentially influence the operational concept.

2.2 Operational Environment and Characteristics

This section describes the operational environment and characteristics of the National Airspace System when viewed as a total system. It begins with a definition of the NAS including all its elements. This is needed in order to provide the scope for the operational concept. Questions such as the inclusion of the regulatory process and/or aviation security must be considered in this definition. Environmental considerations such as operating as part of the National Transportation System and interfacing with the other modes such as highway and rail are identified in this section. Operational characteristics such as a description of the airspace structure and the provision of services 24 hours a day every day of the year are identified in this section.

2.3 Operational Mission and Services

This section describes the mission of the NAS, or any sub-system of the NAS, as it is stated in FAA's enabling legislation and all amendments thereto. All other legislation affecting the FAA mission must also be considered as it relates to NAS operations. This information is found in the US Code. The services that the NAS provides are also summarized as part of this section. This is a high level description of each of the principle services provided by the NAS, or NASA sub-system to the aviation community.

This section should make maximum use of reference materials.

2.4 Functions

This section provides a top-level description of the basic functions including, but not limited to, communications, navigation, surveillance, automation, weather, and operations and maintenance. The specific functions being provided by the system covered by the operational concept are then discussed as part of the overall NAS functions. This approach permits a reader an overall context with which to understand the presented concept.

Care should be taken to graphical represent the functional interfaces as completely as possible, including mapping of the functions to various facilities described in section 2.5.

A specific methodology of discussing and describing the functions should be consistently used throughout the entire operations concept. This methodology should be referenced or discussed in an appendix.

2.5 Facilities

This section describes any facilities used by or in the operational concept. This section should consider the following facilities:

Air Traffic Control System Command Center (ATCSCC)
Air Route Traffic Control Center (ARTCC)
Terminal Radar Control (TRACON) facilities
Automated Flight Service Stations (AFSS)
Air Traffic Control Tower (ATCT) facilities
Dispatcher office or equivalent
Airline Operations Centers (AOC)
National Aviation Weather Processing Facility (NAWP) or equivalent
National Flight Data Center (NFDC) or equivalent

A block diagram depicting the conceptual connectivity of these high level facilities should also be presented in this section. Equipment such as radar, navigation systems communication systems and approach and landing systems may also be included in this section in order to provide a single top level perspective of the NAS however, care must be taken not to duplicate the architectural material to be presented in section 4.3.1.

[Note: a good example of the type of diagram envisioned was provided by Martin Marietta when they served as the FAA's System Engineering and Integration Contractor.]

2.6 User/Operator Profiles and Positions

This section should identify and provide a top-level description of the users involved in any aspect of the concept from an operational point of view, including, but not limited to:

- The air traffic controller positions associated with each of the major ATC facilities (e.g., ATCSCC, ARTCC, AFSS, TRACON, and ATCT). This includes supervisory positions, controller position, specialist positions, and traffic manager positions.

- The Pilots, including discussion of their type--air carrier, air taxi, cargo, military, GA, business jet, and/or rotorcraft.

- The Airline Operations Center (or system) positions and aircraft dispatchers.

2.7 Operational Modes (including top level Operational Sequence Diagrams)

This section identifies the major operational modes of the system including backup modes of operation. Each mode should be defined and its relationship to the other modes discussed. A mode transition diagram should be presented and the conditions under which the transitions taken place described. Operational Sequence Diagrams are one mechanism to present the mode transitions. There should be good connectivity between this section and section 2.6 to address what the users will do in various modes. One particular mode that should be addressed is the 'system failure' mode, i.e., what do the users do when the system totally fails. Off-nominal modes should be identified.

2.8 Operational Process/Operational Sequence Diagrams

The high level ATC processes including the flight planning process, the clearance processes, the departure process, in-flight process, the arrival process, and the post-flight processes are described in this section. Operational sequence diagrams illustrate the actions and reactions of the various system elements in the sequence in which they are performed. Only high level diagrams of the NAS operational process would be used to illustrate the basic processes identified and described in this section.

2.9 A Trip Through the Operational System (a "story")

This section should describe a story or story-line, for each Mode of Operation identified in section 2.7, in the format of a "Trip Through the Operational System". The story or story-line should be comprehensive enough to include all the missions, services, flight phases, and user/operator positions. The story or story-line should cover International and domestic flights including IFR and VFR for the spectrum of user flights, including Airline, Cargo, Air Taxi, Military, GA, business jet and rotorcraft.

2.10 Possible Costs and Benefits

This section should address, at least identify, the possible (either real or potential) costs and benefits associated with any aspect of the operational concept. The details concerning costs and benefits and related methodologies should be contained in a separate document.

2.11 Operational Feasibility

This section should address the question of operational feasibility of the stated OPSCON. If the OPSCON is of a current system, then identification of its operational limits should be addressed. This section should discuss in some detail the specific aspects of the operational system that limit, constrain, challenge, or prevent implementation the OPSCON.

3.0 Functional Viewpoint (by Domain and/or Phase of Flight)

This section provides a detailed functional description of the system operations categorized according to domain or flight phase.

For the purposes of this template, a domain is assumed to be: (1) the Air Traffic Service Provider (ATSP) domain, (2) the Pilot/Air Crew/Flight Deck domain, or (3) the Airline Operations Center (AOC) or Airline Operations System domain. This viewpoint of air traffic operations as a triad lends itself to considering the three domains in a consistent manner taking full consideration of the various interfaces, protocols and procedures that influence and guide each domain. If needed by a particular OPSCON, the operational triad could, of course, be expanded to include infrastructure functions, such as training, maintenance, logistics, administration. Note: sometimes the Air Traffic Service Provider domain is further separated into Air Traffic Control and Traffic Flow Management sub-domains.

For the purposes of this template, a function is defined as an activity that accepts well-defined inputs, submits them to well-defined processes, and produces well-defined outputs. Functions may contain functions in a specified hierarchy. Functions may operate concurrently, sequentially, serially, or in parallel, and be event-driven or always executing. An OPSCON should present a top-level functional viewpoint (by Domain and/or Phase of Flight) and then present successive layers of functional detail sufficient to well-describe the workings of the concept.

For example, the NAS Architecture Version 4.0 has categorized the top level of this description according to flight planning, airport surface, departure/arrival, en route/cruise, oceanic, NAS Traffic Management, and Management functions.

The Air Traffic Service's Vision of the Future ATC System has categorized its description according to preflight activities, the clearance process, departure phase, airborne phase, and arrival phase.

FAA's System Engineering activity defined the NAS Domains according to National, Oceanic, En Route, Terminal, Airport, and Aircraft.

Thus, a comprehensive structure for describing the domains/flight phases and functions of NAS operations must be selected and consistently used as the basis for each of the following sub-sections of this section. The complete domain hierarchy should be made clear in a diagram or graphic that shows the primary interfaces amongst and between the domains and the naming convention that will be consistently followed throughout the OPSCON.

Note: It is easy, when preparing an OPSCON, for a team to become enraptured with the philosophical arguments as to what constitutes a proper 'domain'. The author recommends that the team use a 'domain' approach that covers the widest possible user/provider functions and provide written and graphical definitions of that approach. The final ATM OPSCON has yet to be written and the one that the team is working on is not the final word. Philosophical, the key word in OPSCON is 'concept' and that translates into observations and thoughts about something, not fact.

3.x Domain and/or Flight Phase "X"

This section treats one of the selected categorizations used to describe system operations (e.g., Terminal, En Route, Approach, Surface, Taxiing)

3.x.1 Operational Environment and Characteristics

This section describes how this particular category (e.g., airport surface) interfaces and interacts with the rest of the system. It begins with a definition of the category including all of its major elements. This provides the scope for the concept of operations within this particular category. Operational characteristics of the category such as identification of the services that must be provided and the structure of the airspace of the particular NAS category being discussed are included in this section.

3.x.2 Services

This section provides a detailed description of each of the services provided in this category as identified in the above section. This description includes a discussion of the process used to provide the service, the consumer to whom the service is provided and under what conditions, and a decomposition of the service into a set of sub-services including a discussion of each sub-service identified.

Using the ATS 2005 OPSCON as an example, some Air Traffic Service Provider domain services are:

- Airport Surface Operations and Services
  - Aviation Information
  - Separation Assurance
  - Traffic Management Services
- Departure and Arrival Services
  - Separation Assurance
  - Traffic Management Services
  - Navigation/Landing Services
  - Airspace Management
- En Route/Cruise Operations and Services
  - Separation Assurance
  - Traffic Management Services
  - Airspace Management
- Oceanic Operations and Services
  - Separation Assurance
  - Traffic and Airspace Management Services

Of course, the above listing does not contain any services associated with the Pilot/Air Vehicle domain or the Airline Operations Center domain.

3.x.3 Functions and Facilities

This section is similar to section 2.3 except that it focuses on the particular category or element of the NAS being described. The functions, facilities and equipment used to provide the services and sub-services identified in section 3.x.2 are identified and described in this section. A functional block diagram and a system block diagram depicting the connectivity of these functions, facilities and equipment should also be presented in this section.

Care must be taken not to duplicate material to be presented in section 4.3.1 however, a connection to the information provided in the description of the NAS physical architecture should be drawn.

3.x.4 User/Operator Profiles and Positions

This section should expanded on the section 2.6 positional descriptions of the users to include the functions or tasks that they or the machines that they control perform.

These descriptions should include the inputs to the position, the function of the position, the processes conducted at the position, and the outputs from the position. Systems used to support the function of the position should also be identified.

3.x.5 Operational Modes and Scenarios

This section identifies the operational modes of this NAS category including backup modes of operation. Scenarios for each identified mode of operation are provided. International and domestic flight operations including IFR and VFR are described for airlines, air taxi, cargo, military, GA, rotorcraft and business jet flights that are conducted in this NAS category. Discussion of the impact on FAR Part 91, 121 or 135 should be included in this section.

Off-nominal modes should be identified and the scenarios presented that show or demonstrate how the operational concept will functionally account for these modes.

3.x.6 Operational Process/Operational Sequence Diagrams

The applicable ATC processes including the flight planning process, the clearance processes, the departure process, in-flight process, the arrival process, and the post-flight processes conducted as part of the operations within this NAS category are described in this section. Operational sequence diagrams that illustrate the actions and reactions of the various system and sub-system elements in the sequence in which they are performed are also provided. Detailed operational sequence diagrams should be used to illustrate the basic operational processes identified and described in this section.

4.0 Architectural Viewpoint

This section provides a top-level description of the NAS architecture at three levels: operational, functional, and technical. The technical architecture is further subdivided into physical and logical elements. This architectural

4.1 Operational Architecture

The operational architecture refers to the identification of the services and sub-services provided by the system and the actions of the various system elements necessary to provide these services. A convenient method for illustrating an operational architecture is to use operational sequence diagrams that illustrate the actions and reactions of the various system elements in the sequence in which they are performed. This operational description is envisioned to consist of a minimum of two levels (i.e., at least one decomposition of the major services) of operational description. Additional levels could be provided as Appendices however reference to the NAS Architecture Volume is preferred.

4.2 Functional Architecture

A functional architecture is the traceable and successive decomposition of functions and sub-functions to the level that they can be assigned to system hardware, software, and human elements. In this section, the functional architecture is described through a single decomposition of the major functions identified and described in section 2.4. A functional block diagram at the second level of system decomposition should be included as part of this section and the data flow among the functions should also be identified and described.

4.3 Technical Architecture

The technical architecture consists of the physical and the logical architectures of the system and is described in the following two distinct sections.

4.3.1 Physical Architecture

This description of the NAS Architecture illustrates the physical components of the system including the radar, computers, pilots, controllers, work stations, navigation and landing aids, communications components, and peripheral devices. The description provided in this section should only be at the major subsystem level and should not duplicate the information provided in section 2.4. Rather, it should reflect this information and provide a top level NAS block diagram that shows the connectivity among the various NAS sub-systems and equipment.

4.3.2 Logical Architecture

A logical architecture describes the information and data flow among the physical elements of the system. Thus, this section builds on the NAS level block diagram (section 4.3.1) provided to describe the connectivity among the various NAS sub-systems and equipment, and adds the information and data flow among these sub-systems and elements. This data flow is not to be confused with the functional data flow provided in section 2.4.

The intent of this section is to provide a summary view of the architecture and not to duplicate the architecture description provided in the NAS Architecture Volume.

5.0 System Support/Infrastructure

This section provides an overview of the operations of the NAS support system and infrastructure. NAS support consists primarily of maintenance and monitoring, training, and testing. The NAS infrastructure primarily consists of the equipment and facilities that are operational in the field and the spares that support their maintenance.

5.1 Environment and Characteristics

This section describes how the NAS support system interfaces and interacts with the rest of the NAS and its infrastructure. It begins with a definition of the NAS support system and infrastructure including all of its major elements. This provides the scope for the concept of operations. Operational characteristics of the category such as identification of the services that must be provided and the conditions under which support must occur (e.g., all weather, terrain, other features) are included in this section.

5.2 Services

The primary services provided include maintenance and monitoring, training, and testing. This section provides a detailed description of each of these services. This description includes a discussion of the process used to provide the service, the consumer to whom the service is provided and under what conditions, and a decomposition of the service into a set of sub-services including a discussion of each sub-service identified.

5.3 Facilities

This section is similar to section 2.4 except that it focuses, where relevant, on the particular support facilities of the NAS. These facilities include Airline Operations Centers (or Systems), Aircraft dispatcher facilities, the FAA Technical Center, the Aeronautical Center, flight inspection aircraft, FAA regional offices and HQ, and the FAA Depot. The functions, facilities and equipment used to provide the support services and sub-services are identified and described in this section.

A functional block diagram and a system block diagram depicting the connectivity of these functions, facilities and equipment should also be presented in this section.

5.4 Personnel

This section provides descriptions of the personnel and organizations associated with the support functions. Maintenance personnel, training personnel, and test personnel positions and functions are described in this section.

5.5 Procedures and Scenarios

This section provides a description of the support procedures that are used in the NAS. For example, routine scheduled maintenance procedures are described as well as non-routine, emergency maintenance procedures. Academy training and on-the-job training are also discussed. Certification of operational equipment is also within the scope of this section. Scenarios describing typical and atypical operations are provided.

6.0 Issues and Recommendations

This section provides a mechanism for documenting issues, key decisions points and recommendations that are identified during the development of the operational concept. These issues may be concerned with concept feasibility, concept evaluation, design or development activities.

6.1 Issues Summary

This section focuses on the identification and the description of the major issues that have been identified during the development of the operational concept. It might include issues such as inadequate backup capabilities, mandatory avionics requirements, identifiable lack of detail in the NAS architecture description, training challenges, or available architecture alternatives with either no decision or insufficient data to make an informed decision. The problem of identifying or justifying implementation funding or transition issues should also be addressed.

6.2 Key Decision Points

This section identifies the future points in time at which decisions must be made concerning alternatives or when critical issues must be resolved in order to avoid negative impacts on the NAS.

6.3 Recommendations

This section provides a set of recommended action to mitigate the risk associated with the identified issues and the essential decision points.

References/Bibliography

This section should contain any references used in the operational concept. To aid the reader each reference should also contain a cross-reference to the section of the operational concept that uses it.

Some specific useful references are:

1. Federal Aviation Administration (1997). *ATS Concept of Operations for the National Airspace System in 2005: Operational Tasks & Scenarios*. Washington, DC: Federal Aviation Administration. Note: Good details for understanding the tasks facing an Air Traffic Control Specialist.

2. Federal Aviation Administration (1997). *ATS Concept of Operations for the National Airspace System in 2005: Narrative*. Washington, DC: Federal Aviation Administration. Note: Very good overview of Air Traffic Service's thoughts concerning ATC in 2005.

3. Federal Aviation Administration. *Air Traffic Services Performance Plan for Fiscal Years 1997-1999.* Washington, DC: U.S. Department of Transportation.

4. Federal Aviation Administration. Air Traffic Control Handbook (7110.65). *Washington, DC: U.S. Department of Transportation.* Note: Version L is current. Probably the single best document for understanding the viewpoint of the Air Traffic Control Specialist.

5. Federal Aviation Administration (1993). National Airspace System Operational Concept NAS-SR-130. DOT/FAA/SE-93-1. Washington, DC. Note: Actually authored by William

Trent and Thomas Pickerall of the Computer Resource Management, Inc. Although a bit dated and contains discussion of the discontinued concept of Area Control Facilities, the document has operational details not easily found in other documents.

6. Federal Aviation Administration (1999). National Airspace System Architecture: Version 4.0. Available on FAA's Website: www.faa.gov. Note: This is the up-to-date collection of information dealing with the various systems either deployed or soon to be implemented. A good feeling for the possible evolution of the NAS is also contained in this document. It is updated annually.

7. Flight Management System - Air Traffic Management Next Generation (FANG) Operational Concept DOT/FAA/AND-97/7. Note: This is a 'must' read for all those interested in preparing good operational concepts.

8. ICAO/DO-9254, "Future Air Navigation System," (FANS) Report, International Civil Aviation Organization, May 1988.

9. RTCA. *Final Report of RTCA Task Force 3 Free Flight Implementation*, RTCA, Inc. February 1996. Note: This is the original report that started the push for Free Flight across Government and Industry. It is a 'must' read document for all those interested in understanding the free flight concept and related literature.

Appendix 1. Linkages amongst Operational Concept Chapters 2, 3, 4 and 5

To aid the reader in finding relationships, usually quite complex, amongst the various portions of the operational concept, a linear or matrix presentation of the various item of the operational concept in Chapters 2, 3, 4 and 5 should be presented.

Appendix 2. Linkages between Chapter 2 and an External Test Plan

The proof of a concept is in a rigorous testing process that verifies and validates the initial conceptual thinking with field and/or experimental data. It is imperative that specific items within the operational concept be specifically tested in a straightforward manner to answer the question of "does the system do what it is supposed to do?"

Appendix 3. Supporting Information and Notes

This appendix should contain detailed supporting notes, papers, minority opinions and observations, research summaries and other types of supporting material. Extensive use of references should be used.